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Geelong's 21st Century Garden
Sex Outside the City: Habitat Fragmentation and Rare Plants
Vouchering—Essential to Best-Practice Restoration Ecology

This Issue

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Front Cover: *Ranunculus anemoneus* was on the threshold of extinction in the 1940s as a result of over 100 years of alpine area grazing by domestic stock. Following the removal of grazing and the subsequent rehabilitation and revegetation works by the NSW Soil Conservation Service, the species has recovered and viable populations now occur in several different habitat sites across the Kosciuszko alpine area.
Photo: C. Totterdell © ANBG

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*"To promote and develop
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Assessing Translocation Success

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Plant translocations are one of the many tools used by conservationists and land managers to conserve threatened species. Translocation methodologies and protocols are still evolving as we learn more about the biology of the species translocated and more long-term data is gathered about the success of the procedure.

But how do we know whether or not our new population is going to survive in the long term? Defining success criteria is probably the most difficult part of planning a translocation. Success is commonly considered to have been achieved if a high proportion of the plants have survived—however, it is not at all clear how many plants are needed for a successful translocation. Pavlik (1996) suggests that, with a little knowledge of the species' biology, an estimation can be made of what numbers are needed to create a viable population. For example, a woody perennial may have a smaller minimum viable population size than a herbaceous annual. Many studies underestimate this figure (Guerrant, 1996), and for many other projects this figure is simply an arbitrary number chosen with little knowledge of the minimum size for a viable population.

The goal of reintroduction can be defined as the establishment of a resilient self-sustaining population that has the genetic resources to enable evolutionary changes (Guerrant 1996). So the criterion of the newly planted population successfully reproducing is often used as an indication of success. Morgan (1999) assessed whether 48 grassland species had successfully been reintroduced in western Victoria, where one criterion used was whether the species had successfully reproduced. Despite many species producing viable seed, only five taxa had successfully recruited second generations up to 12 years after translocation. The seedling recruitment process was highlighted as one of the most important components to determining long-term translocation success (Morgan, 1999).

Another criterion that is often used is the down-listing of a species from one threat category to another. Kaye (1997) listed the ultimate goal of the reintroduction

program for the Pink Sand Verbena (*Abronia umbellata* subsp. *breviflora*) as the down-listing of the species from the endangered list. While such an objective may be appropriate for some species, it needs to be cautioned that such a goal is unrealistic for many naturally restricted species. Other studies fail to define success at all: a review of 46 translocation programs undertaken in the USA revealed that 31 programs failed to have any measure of success defined (Fiedler, 1991).

In Western Australia translocation programs run by the Department of Conservation and Land Management use many of the above methods to assess translocation success. However, many of our species have long juvenile periods or may not recruit in the absence of disturbance

events, so another level of assessment is also needed. The approach suggested by Pavlik (1996) has been adopted; where comparisons are made between traits of the new population and a reference population or populations. In our case we have chosen the natural populations of the same species as the reference population, but Pavlik (1996) suggests that populations of a common congener or common species with the same life history traits can also be used.

Measurements have been made of the level of flowering and fruiting, and assessments will be made of the size of the soil seed banks. These measurements have been made for the critically endangered *Acacia aprica* (Blunt Wattle). This species was known from only six populations, with a combined total of 220 plants, when the decision was made to translocate. Five populations occur on narrow degraded road verges and one population occurs in remnant vegetation in private property. A nearby local shire reserve was deemed to be the best translocation site, and in 1998 1500 seed were sown at the site. When only one seed germinated the decision was made to switch to seedlings in the following year. Of the 181 seedlings planted in 1999, 88% are surviving in 2002 and all successfully produced seed in 2001. The fate of buds on tagged branches was followed through to seed set in 2001 (Fig. 1) and is currently underway for 2002.



© Leonie Monks/Dept. Conservation and Land Management

Planting of the nationally endangered Three Springs *Daviesia* (*Daviesia bursarioides*) by volunteers and Dept. Conservation and Land Management staff. This species is known from only six small populations, and augmentation of one of the populations was considered the best option for the translocation program.

It appears that in some respects the new population of *Acacia aprica* has similar reproductive attributes to the natural populations. Although the number of inflorescences per branchlet was considerably lower than any of the natural populations, the number becoming legumes was high. This resulted in an inflorescence to legume ratio similar to that of the natural populations 1 and 3. The number of viable seed per legume was considerably higher for the translocated population. The young age of the plants in the translocated population may account for some of the differences; however, clearly there was considerable variation between the different natural populations as well. Natural variation could therefore account for some of the differences between the translocated and natural populations. The monitoring program will continue to follow these attributes and a pattern may become clearer in the coming years.

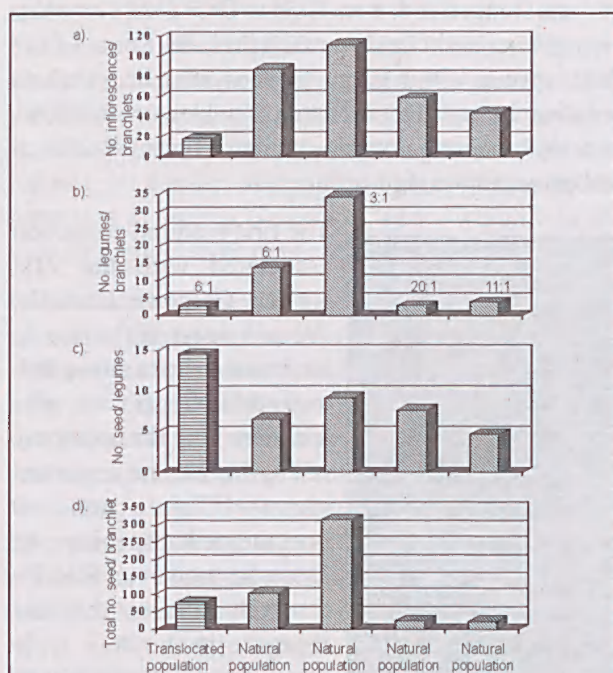


Figure 1. Mean reproductive attributes for the translocated population of *Acacia aprica* compared to the natural populations of the same species in 2001. Inflorescence to legume ratio shown above bars in figure 1b. Data for the natural populations from Yates and Broadhurst (2002).

This monitoring technique, which involves comparing traits of translocated populations with those of natural populations, has many advantages. The data is easy to collect and has the added bonus of increasing our knowledge about the species' biology at the same time. It also provides an easily quantifiable basis for assessing translocation success. The up-coming revision* of the Australian Network for Plant Conservation's Translocation Guidelines (ANPC Translocation Working Group, 1997) will be an ideal opportunity to debate this and other monitoring techniques, and to discuss and define long-term success criteria for plant translocations. *See the note on the revision in the National Coordinator's Report (p. 5) to have input into the revision.

Acknowledgments

Thanks to all those people who have enthusiastically helped plant hundreds of seedlings and who have patiently assisted with the enormous task of monitoring all these plants. Thanks also to Dr. David Coates who initiated the translocation program and has been of enormous support over the past four and a half years. The project has been partially supported by a grant from the Endangered Species Program of the Natural Heritage Trust.

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Blunt Wattle (Acacia aprica) is listed nationally as an endangered species and is classified as critically endangered in WA. It is the subject of a Dept. of Conservation and Land Management project.
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Geelong's 21st Century Garden

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On the 6th of September 2002 the Governor of Victoria, John Landy, officially opened the 21st Century Garden extensions of the Geelong Botanic Gardens (GBG). The 21st Century Garden is a unique project and represents a significant milestone in the implementation of the gardens' Masterplan, which aims to link the historic roles of a heritage botanic garden to the contemporary.

The GBG is the fourth-oldest botanic garden in Australia and was founded in 1851. As such, the original garden is a heritage treasure with numerous significant exotic and Australian native trees. Some 39 are listed on the Heritage Victoria Significant Tree Register.

Geelong's 21st Century Garden dates back to 1994, when a comprehensive study of the Geelong Botanic Gardens and the surrounding Eastern Park was undertaken. The study concluded that action was needed to prevent the gardens from failing to fulfil the true roles of a botanic garden with respect to education, conservation, research, and the professional management of diverse plant collections. On-ground works commenced in May 2001.

Within an hour's drive of the Geelong CBD one can see an astonishing array of plant communities and plant diversity, with almost 10% of the Australian flora represented. To date no public garden has showcased these plants, and so indigenous plants were given an important consideration when developing planting themes. There are three main planting themes, which were borne out of a series of planning workshops held at the gardens with participation from the design team, staff and the friends group. The themes that have been adopted for planting are Regional Relevance, Plant Adaptation, and Plant Evolution.

The 21st Century Garden is an honest reflection of the Geelong environment, and the GBG is taking the lead in establishing an interest in local plant species that are naturally adapted to the dry temperate climate of the region. It's interesting to note the community

acceptance of this approach. Over the first opening weekends we undertook exit interviews and invited comment and appraisal of the various planting themes. The indigenous plantings were consistently rated as the most relevant and interesting of all

The indigenous collections focus in the main on three significant regional plant communities: the Grassy Ecosystems and the Heathlands associated with the Brisbane Ranges; and Anglesea Heath. Some of the signature species in the heathland beds include the endemic and rare Anglesea Grevillea, *Grevillea infecunda*, and the Brisbane Ranges endemics Golden Grevillea, *Grevillea chrysophaea* and *Grevillea steiglitziana*. Some of the feature species within the grassy ecosystem beds include the nationally endangered Button Wrinklewort, *Rutidosia leptorrhynchoides*, alongside numerous plant species of local conservation significance.



Part of Geelong's 21st Century Garden, with a Bunya Bunya Pine (*Araucaria bidwillii*) in the centre.

The first featured collection associated with the 21st Century Garden is *Dianella*. We are most fortunate to have established a strong link to botanist Geoff Carr, who is undertaking the taxonomy of this diverse and important group. There are 40 documented species of *Dianella*; however, Geoff's research indicates that this figure is not truly representative. Geoff asserts that there are well over 100 species, including several with significant conservation status. The collection held at

the GBG is intended to display and interpret this significant genus and to support Geoff Carr's research.

The lowland grassy ecosystems of the Victorian Basalt Plains are considered to be amongst the most threatened ecosystems in Australia. Less than 1% of natural vegetation cover remains and there are numerous significant remnant communities represented in the region. The GBG aims to establish an active and responsive conservation collection, taking its priorities from some of these pressing local plant conservation issues. Notwithstanding the limitations of *ex situ* conservation, the aim of the GBG collection will be firmly placed on the potent interpretative and educational value of displaying rare plants in a community garden.

The conservation collection will be used to display a selection of the region's rare plants in a number of situations and locations throughout the gardens, including the 21st Century Garden. It's not the 'Rare and Threatened Plant Bed' approach to displaying these plants as a collective, but more about incorporating rare plants into existing thematic and geographic displays. While the majority of the taxa selected will indeed be purely display plants, it is intended with a limited number of taxa to link our activities to the work of other conservation agencies who are facilitating plant recovery and various activities in the field. This approach would see a strong link established to *in situ* plant conservation priorities associated with the Environment Unit of the City of Greater Geelong.

The City of Greater Geelong commissioned a Biodiversity study in 2001. This study aimed to fully document the biodiversity of the region, which has been heavily modified over the past 150 years. Little remains of the natural vegetation, with an estimated 5 % of the total land area having a cover of indigenous vegetation. The study identified a number of significant plant species in these remnants including *Geranium* 'sp.1', which was previously thought to be extinct.

It is the desire of the GBG to be actively involved in all aspects of the conservation of this and other such taxa within the city's jurisdiction. Essentially this would revolve around building up robust and representative *ex situ* populations, facilitating and supporting research activities, establishing translocation and relocation protocols, an involvement in the management of the naturally occurring populations and, perhaps most importantly, informing a community of the rare treasures that are 'on the brink' in their own backyards. *Geranium* 'sp. 1' is the feature species of the upcoming ANPC Conference to be held in Geelong, 25th February - 1st March 2003.



Rutidosia
leptorrhynchoidea
(Button Wrinklewort) is
featured in Geelong's 21st
Century Garden. It is
listed nationally as an
endangered species.
Illustration T. Woolcott
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Botanic Gardens

National Coordinator's Report

ANPC Conservation Techniques Training Program

Positive and encouraging feedback has been received from the NSW Environmental Trust following the progress report submitted on the ANPC's current training program. Three courses have been held since December 2001, with a total of 140 participants attending. Congratulations were received on the breadth and depth of the program, and the variety of courses offered in terms of topics, length and location. My thanks go to all those who have supported the program to date. Plans are well underway for the fourth workshop in the current series. This will focus on rehabilitation and will be held in Yass, NSW.

Conference

The Fifth ANPC National Conference, entitled Recovery: A Decade Towards a Biodiverse Future, is shaping up to be an exciting program. Hosted by the City of Greater Geelong, it will be held in Geelong from Tuesday 25th February to Saturday 1st March 2003. There will be an increased emphasis on conservation techniques training workshops, after the immense response to the workshops held at the ANPC's previous conference in Albury in 1999. There is still room in the program, so if you are interested in presenting a paper, workshop, symposium, poster or conservation techniques workshop, contact the ANPC national office, or use the forms provided.

ANPC Committee nominations

Nominations for the new ANPC Committee to govern the organisation for the next two years have been received. As nominations have not exceeded positions available, no election will be required. The new Committee will be announced at the Annual General Meeting. The date for this meeting is to be determined.

ANPC Translocation Guidelines Revision

The ANPC publication *Guidelines for the Translocation of Threatened Plants in Australia* is due to be revised over the coming year. The guidelines were first published in 1997, so it is likely that theory, approaches, techniques and players have all changed somewhat since that time. It will also now be possible to improve the layout, structure and general 'useability' of the publication. In order to make this a comprehensive review, the editors and authors will require input from a wide range of people, including community groups that have used the guidelines, researchers in the field of translocation, government agencies and industry officers involved in translocations, and anyone else who has a part to play. Please contact the National Office (details in the front of *Danthonia*) if you would like to comment on the revision.

Sex Outside the City: Habitat Fragmentation and Rare Plants

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To effectively manage plant populations for conservation, there is a need to provide reliable information on the conditions required for maintaining viable populations. This is particularly true for those rare taxa occurring in a fragmented landscape, such as that of south-western Australia. Hence a research project has been formulated to investigate the effects of landscape fragmentation on rare plant species and whether a general framework of responses can be developed.

The Birds, the Bees and the Bulldozers

The flora of south-western Australia is strikingly diverse at the species level with an estimated 8000 taxa, 75% of which occur nowhere else (Paczkowska & Chapman, 2000). The high degree of endemism and the diversity of the flora coupled with extensive clearing of the native vegetation has led to this area being recognised as one of 25 biodiversity hotspots of the world (Myers *et al.*, 2000).

Clearing of native vegetation and the subsequent fragmentation of the landscape are widely accepted as the greatest threats to terrestrial biodiversity around the globe (Ehrlich, 1988; Rathcke & Jules, 1993). Although native vegetation clearing was previously a major threat to plant diversity in the south-west of Australia, it is presently only of concern in specific areas, such as significant remnants occurring on private lands. What remains after broad-scale vegetation clearance are remnants of vegetation occurring within a matrix of agricultural, pastoral or other developed landscapes.



Rose Mallee (*Eucalyptus rhodantha* var. *rhodantha*), an endangered species from the Geraldton Sandplains bioregion.
Photo courtesy Dept. Conservation and Land Management / Babs & Bert Wells.

Accumulated evidence gleaned from numerous studies suggests that habitat fragmentation (amongst other impacts) reduces the size of species populations, increases their isolation, alters the nature and impacts of disturbance, and commonly alters their abiotic environment (Saunders *et al.*, 1991; Hobbs, 1993; Glanznig, 1995). Recently, attention has focused on the flow-on effects of landscape fragmentation, particularly

on the species loss from remnants and how this may affect the functioning of the system and the interactions between species. Of particular concern is the loss of mutualisms between some plant species and their animal pollinators (Bond, 1994; Johnson & Steiner, 2000).

There are very few quantitative data on how population size and landscape context affects the demographic and genetic processes that maintain viable populations of plants. Consequently, we have little idea about how many plants are needed to maintain a stable and viable population and how the context of that population affects its extinction risk. This is of major concern since a large

proportion of rare plant taxa occur over the landscape in populations of different sizes and contexts (e.g. road verges; private remnants of various sizes; small and large nature reserves). The lack of information in this area directly impacts upon the on-ground management of rare plant populations.



Star Sun Orchid (*Thelymitra stellata*), an endangered species from coastal granite outcrops south of Perth.
Photo courtesy Dept. Conservation and Land Management / Andrew Burbidge.

The reproductive success of any plant population is affected by several factors, including: population size; degree of isolation; dependence on specialised pollinators; an absence of alternative reproductive mechanisms such as self-fertilisation and vegetative reproduction (resprouting); and a poor ability to compete with more abundant taxa for pollinators (Rathcke & Jules, 1993; Kearns *et al.*, 1998). Furthermore, many small, relict populations of rare plant taxa occur in areas that have been fragmented and degraded to the extent where the native pollinator vectors may be absent from the environment. The above factors significantly alter seed set and have the potential to increase the extinction risk of a plant species. This may be particularly so for rare plant species occurring within a fragmented landscape.

However, the resources do not exist to undertake comprehensive studies of population dynamics for every plant species of south-western Australia. Nowhere is this more evident than in the area of rare plant management where, in 2002, there are 121 taxa listed in the Western Australian Government Gazette as Critically Endangered, 112 Endangered and 119 Vulnerable. Currently, the degree of threat and progress towards a recovery plan dictates the taxa for which research will be undertaken (Coates & Atkins, 2001). This approach, however, should be regarded as crisis management as it may not yield the quantitative data required for Endangered and Vulnerable species and indeed other Critically Endangered taxa.

Sex in a Fragmented Landscape

How then can insights be rapidly and accurately gained into the effects of population size and landscape context on reproductive success, and how can these insights be applied across such a broad range of taxa? In May 2002, an Australian Research Council funded research project was initiated between Murdoch University and the Department of Conservation and Land Management to address this problem. In this project we suggest that we can focus our research efforts and define which taxa we study by assigning rare plant taxa into functional groups, based on:

- Their floral architecture and putative pollinator, and;
- Their fire life history (sprouter versus non-sprouter) and germination requirements.

Specifically, the aims of the project are:

- To categorise threatened plant taxa on the basis of functional attributes, and choose taxa for detailed investigation on the basis of their distribution across the landscape and potential to deliver quantitative data.
- To develop models for each floral architecture functional group on how rates of pollination, seed production, genetic diversity and seed fitness are affected by population size and landscape context.
- To extrapolate information from models for each floral architecture functional group to other taxa in that group to provide guidelines for flora conservation, including translocations, threatened ecological communities and restoration/revegetation programs.

Through the proposed research we hope to produce profiles of how the demographic processes of rare plant species are affected by population size and landscape context for each of the floral functional groups. The rationale would be to use these profiles to determine whether there are thresholds in population size or position in the landscape at which reproductive rates and genetic fitness decline severely. General guidelines on minimum population sizes could then be developed for each functional group.



Ironcap Banksia (*Banksia sphaerocarpa* var. *dolichostyla*), a vulnerable species from the South West botanical province. Photo courtesy Dept. Conservation and Land Management/Andy Chapman

For further information on this project contact Andrew Franks, School of Environmental Science, Murdoch University, Murdoch, WA, 6150 Ph: 08 9360 7224 afranks@essun1.murdoch.edu.au.

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Addendum

The article published in *Danthonia* vol. 11 no. 1 titled 'Ecotourism—a Creative Approach to Weed Control on Lord Howe Island', by Ian Hutton, was originally published in *Ecological Management and Restoration* vol. 2 no. 2 (Aug. 2001).

Apologies to the editor and the board of EMR for not including this information with the article.

Vouchering—Essential to Best-Practice Restoration Ecology

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Plant restoration ecology has as a major goal the return of a degraded site to something approaching the original state, in terms of ecosystem function and biodiversity. At a practical level, this usually involves the replacement of exotic and invasive taxa (species, subspecies, varieties etc.) with taxa that are endemic to that site. But how do we know what is endemic to that site, and how the taxon composition is changing over time? Usually we rely on taxon lists generated from surveys. However, it is vitally important that these lists are supported by samples (or vouchers) of the plants on the list. I will outline the reasons why below.

Taxon lists are usually treated as explicit statements of what is at a particular site at a particular point in time. However, in the absence of vouchers taxon lists are not

verifiable, and so must be taken as an article of faith. Capable as most compilers of taxon lists undoubtedly are, we cannot go back in time to challenge, test or revise their lists in the light of new information and therefore they do not constitute a sound basis for a scientific approach to restoration ecology. Basing a restoration program on unverifiable data is at best risky and at worst destructive. A hypothetical example might help illustrate this:

Snugglepot compiles a taxon list for a degraded woodland remnant and identifies a population of plants as belonging to the widespread and variable species *Planta variabilis*. Five years later Cuddleprie publishes a taxonomic revision in which *Planta variabilis* is split into three species with non-overlapping but adjacent geographical ranges. The woodland is situated at the range limits of two of the species, both of which are listed as endangered. The Banksia Men initiate a restoration program on the woodland but a survey fails to locate the taxon previously identified by Snugglepot as *Planta variabilis*. The Banksia Men are faced with some big and unanswerable questions:

- Was Snugglepot's identification of *Planta variabilis* correct?
- If so, to which of the endangered species recognised by Cuddleprie did that population belong?
- To restore this woodland, which of the two endangered species (or both) should be planted?

If only Snugglepot had made vouchers Cuddleprie could give the Banksia Men some answers!

What is a Voucher?

A voucher in this context is a physical, verifiable record of the existence of an individual plant at a particular place and time. It consists of a pressed and dried specimen together with information on the place, time and site features (such as soil type, topography, habitat etc.) relevant to the collection.

How do I Make a Voucher?

I cannot hope to detail properly in the space available the techniques involved in making adequate vouchers. The following should be seen as guidelines only and I encourage readers to consult a person experienced in plant collecting or a plant taxonomy textbook. A few useful sources are listed at the end.



A well-prepared herbarium specimen clearly displaying as full a range of morphological features as possible, together with locality (latitude, longitude, altitude) and habitat (vegetation type, soil type, associated species) data. Material that has become dislodged from the specimen is usually kept in a small plastic bag securely attached to the sheet.

Selection of material: Ensure you have any necessary permits before collecting plants. When selecting parts of the plant to make your voucher, remember that the main purpose of vouchering is to enable accurate identification of the material. Which parts of the plant are most useful for identification varies widely among taxa. For example, seeds are important to distinguish species of *Calandrinia* (Portulacaceae), whereas leaf characters may be sufficient in *Cryptocarya* (Lauraceae). Therefore, a good rule of thumb is to collect the full range of material that is available to you. This could include flowers, fruits, leaves, bark, etc. However, plants are seasonal creatures so fertile material will be often unavailable. In the case of small herbs that are abundant at the site, an entire plant including the roots could be collected. If resources (time or space) are limited, fertile material (flowers/fruit, or sporing material) should be your priority. If vouchering threatened species, take special care to minimise the impact on the population.

Field data: Specimens should be uniquely and securely labelled. The collector's name(s) and a number written in pencil (most inks are not waterproof) on a string tag and tied to the specimen is a widely-used method. Taking accurate field data is as important as the physical specimen itself. These data should be recorded in pencil in a bound field book with the unique number linking the information to the plant specimen. The minimum information would be the locality (including latitude, longitude and altitude if possible), the landform (e.g. steep slope), soil type (e.g. clayey loam), habitat (e.g. open woodland) and the habit of the plant (e.g. shrub 1 m high). Ideally, information on abundance, associated species, underlying soil substrate, etc. would be recorded. Good record keeping should be maintained throughout the revegetation process.

Preservation: Plants are commonly preserved by pressing and drying them in the field between several sheets of newspaper in a plant press. A number of specimens may be stacked with a sheet of corrugated cardboard separating each of them. If a plant press is not available, a few heavy books on top of the stack will suffice. When pressing, attention should be paid to the display of features important for later identification. For

example, flower petals should be spread out where possible and care taken to avoid folding leaves.

Collection and preservation of lichens, mosses, liverworts, aquatic plants etc. may require somewhat different techniques to those outlined here, but space prohibits a thorough treatment of these. None of these groups is any less important than terrestrial vascular plants for restoration ecology and I suggest you contact an herbarium for advice on vouchering these plants. A forthcoming manual on plant conservation techniques (to be published by the ANPC) will contain a chapter on vouchering.

What do I do With a Voucher?

Voucher specimens are best sent to an herbarium where they can be accurately identified and curated by dedicated and skilled staff. A list of world herbaria can be found at <http://www.nybg.org/bsci/ih/> and Australian herbaria can be found via the search page at this site. Herbaria are usually happy to receive well-prepared specimens, but contact them first to make sure. Lodgement in a recognised herbarium maximises the long-term prospects for the specimen. It also maximises the value of your collection because the unique and irreplaceable information your specimens represent is made available to other researchers and the wider community. Your specimen could document the presence of a taxon in an area in which it was previously unknown, or perhaps represent a taxon that is new to science!

Further Reading

Further reading on collecting and preserving plant specimens can be found in most good books on plant taxonomy. Three honourable mentions are:

Davis, PH & Heywood, VH 1963, *Principles of angiosperm taxonomy*, Oliver & Boyd, Edinburgh.

Stuessy, TF & Sohier, SH (eds.) 1996, *Sampling the green world: innovative concepts of collection, preservation, and storage of plant diversity*, Columbia University Press, New York.

Woodland, DW 2000, *Contemporary plant systematics*, 3rd edition, Andrews University Press, Berrien Springs, Michigan.

ANPC Regional Groups - Coordinator Contact Details

Sydney Region

Tracey Armstrong, Mount Annan Botanic Garden. Ph: 02 4634 7939 Email: Tracey_Armstrong@rbgsyd.nsw.gov.au

Illawarra and South Coast NSW Region

Paul Formosa, Wollongong City Council. Ph: 02 4225 2638 Email: pformosa@wollongong.nsw.gov.au
Roger Hart, Booderee Botanic Garden, Jervis Bay. Ph: 02 4442 1122 Email: roger.hart@ea.gov.au

Tasmania

Andrew Smith, Parks and Wildlife Service Tasmania. Ph: 03 6233 2185 Email: andrews@dpiwe.tas.gov.au

NSW South West Slopes Region

Paul Scannell, Albury Botanic Gardens. Ph 02 6023 8769 Email: pscannell@alburycity.nsw.gov.au

For regional group reports see page 13.

Research Roundup

Cochrane, A.; Brown, K.; Cunneen, S. & Kelly, A. 2002. Variation in seed production and germination in 22 rare and threatened Western Australian *Verticordia* (Myrtaceae). *Journal of the Royal Society of Western Australia*. 84(3): 103-110.

Cramer, V.A. & Hobbs, R.J. 2002. Ecological consequences of altered hydrological regimes in fragmented ecosystems in southern Australia: impacts and possible management responses. *Austral Ecology*. 27(5): 546-564.

Hannah, L., et al. 2002. Conservation of biodiversity in a changing climate. *Conservation Biology*. 16(1): 264-268.

Morrison, D.A. 2002. Effects of fire intensity on plant species composition of sandstone communities in the Sydney region. *Austral Ecology* 27(4): 433-441.

Muller, S. 2002. Diversity of management practices required to ensure conservation of rare and locally threatened plant species in grasslands: a case study at a regional scale. *Biodiversity and Conservation*. 11(7).

Pfab, M.F. 2002. An integrative approach for the conservation and management of South Africa's floristic diversity at the provincial level. *Biodiversity and Conservation*. 11(7).

Pryce, J.; Edwards, W. & Gadek, P.A. 2002. Distribution of *Phytophthora cinnamomi* at different spatial scales: when can a negative result be considered positively? *Austral Ecology* 27(4):459-462.

Theobald, D.M. & Hobbs, N.T. 2002. A framework for evaluating land use planning alternatives: protecting biodiversity on private land. *Conservation Ecology*. 6(1): 5.

Various. 2002. Conservation, the 47th Annual Symposium of the Missouri Botanical Garden (various papers). *Annals of the Missouri Botanical Garden*. 89(2): 125-224.

Wooller, S.J.; Wooller, R.D. & Brown, K.L. 2002. Regeneration by three species of *Banksia* on the south coast of Western Australia in relation to fire interval. *Australian Journal of Botany*. 50(3): 311-317.

By Tim Coutts

Electronic Addresses

Australian Natural Resources Atlas

This website contains the compiled and analysed results of the National Land and Water Resources Audit, which was a four-year project that ended in 2001. The information is organised by theme and geography. Information available includes the data and reports used to compile the atlas, publications and summary documents, and maps. Searches can be performed on place names, and new layers can be added to the maps from the data available. The thematic reports are available in hard copy from National Land and Water Resources Audit, Level 2 Unisys Bldg, 91 Northbourne Ave, Turner ACT 2612 Ph: 02 6257 9516 Fax: 02 6257 9518 email: info@nlwra.gov.au <http://www.environment.gov.au/atlas>

Australia's Biodiversity Clearing House Mechanism

Developed by Environment Australia, this site provides a forum for the exchange of information on the UN Convention on Biological Diversity and the National Strategy for the Conservation of Australia's Biological Diversity. The site includes the Clearing House Information Manager, which has links to recent postings of information and events relevant to the convention; a list server to receive notice of postings; and documents on national and international strategies, objectives and obligations. <http://chm.environment.gov.au/index.html>

ConserveOnline V. 2.0

This site contains a library of conservation related material, including published material, grey literature, unpublished papers, maps and data. The database can be searched by keyword, geography, title and author, or listed by subject category. The site also allows users to add their own resources to the database and includes discussion groups. It is easy to navigate, and the information is also available in Spanish and Portuguese. <http://www.conserveonline.org>

2002 IUCN Red List of Threatened Species

The web-based version of the 2002 Red List has just been released, providing access to current information on the conservation status of plant and animal taxa around the globe. The majority of plant taxa that were listed in the 1997 IUCN Red List of Threatened Plants have not yet been evaluated against the revised Red List Criteria and are therefore not included in the 2002 IUCN Red List database. To find out the conservation status of plants, users must search both this database and the UNEP-WCMC Threatened Plants database at: http://www.wcmc.org.uk/species/plants/red_list.htm. The 2002 IUCN Red List can be found at: <http://www.redlist.org/>

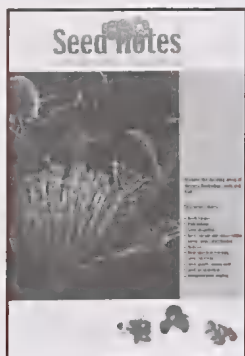
Publications and Information Resources

Seed Notes for Western Australia

Anne Cochrane, 2002

Wildflower Society of Western Australia (Perth Branch)

A series of colourful brochures, which contain clear, illustrated information on the distribution and habitat, reproductive biology, seed collection, seed quality assessment and seed germination for 16 important Western Australian genera. References and recommended reading are also provided. Much of the information on seed collection and germination techniques has come from the Department of Conservation and Land Management's (WA) work with rare and threatened species.



Copies of Seed Notes can be obtained by contacting the Wildflower Society of Western Australia, PO Box 64, Nedlands, WA 6909. Ph: 08 9383 7979 or the Department of Conservation and Land Management, 17 Dick Perry Ave, Technology Park, Western Precinct, Kensington, WA 6151 Ph: 08 9334 0333.

Australian Native Vegetation Assessment 2001

National Land and Water Resources Audit, 2001

This report provided some of the baseline information for the Australian Natural Resources Atlas (see Electronic Addresses). Pre- and Post-European vegetation cover is described and quantified, conservation options discussed, and changes in land cover and percentage of vegetation communities in protected areas documented. Information is also provided on the approach used to gather and interpret the data. Hard copies are available from National Land and Water Resources Audit, Level 2 Unisys Bldg, 91 Northbourne Ave, Turner ACT 2612 Ph: 02 6257 9516 Fax: 02 6257 9518 email: info@nlwra.gov.au or view a web-based version: http://audit.ea.gov.au/ANRA/docs/theme_reports.cfm.

How to Plan Wildlife Landscapes: a Guide for Community Organisations

SJ Platt, 2002

Department of Natural Resources and Environment

This publication aims to help community organisations and interested individuals understand the principles for conserving wildlife at a landscape scale, such as a neighbourhood or sub-catchment. It is available online at <http://www.nre.vic.gov.au/> (follow the links to conservation, then living systems). Hard copies can be purchased from NRE, PO Box 500, East Melbourne, Vic. 3002.

A Clash of Paradigms: Community and Research-Based Conservation

D Lunney, C Dickman & S Burgin (eds.), 2002
Royal Zoological Society of New South Wales

This collection of papers tackles the prickly issue of assessing the effectiveness of community-based conservation. With paper titles including 'A bizarre and threatening process: the by-passing of ecological research when tackling environmental issues' this promises to be a thought-provoking read.

Contact the Royal Zoological Society of New South Wales, PO Box 20, Mosman NSW 2088
Ph: 02 9969 7336 email office@rzsnsw.org.au

Managing Native Grassland

DA Eddy, 2002
WWF Australia

Part of WWF Australia's Monaro Remnant Grasslands Project, this 20 page, full colour, A4 booklet has been written to provide a basic understanding of the ecological function and management needs of natural temperate grasslands in south-eastern Australia. The booklet seeks to guide and encourage good management of remaining native grasslands. The information comes from the NSW Southern Tablelands, but is written in general terms so as to be useful throughout the Tablelands and beyond.



The Guide can be downloaded from <http://www.wwf.org.au/content/publications> or contact David Eddy Ph: 02 6257 4010 email: deddy@wwf.org.au

Southern African Plant Red Data Lists

Janice Golding (ed.), 2002
Southern African Botanical Diversity Network

Part of the SABONET report series, this book presents plant Red Data Lists for ten southern African countries—Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. About 4,100 plant and tree species for this vast region are classified here into various categories of extinction risk according to internationally used principles laid down by the IUCN.

To obtain a copy, contact The Project Coordinator, Southern African Botanical Diversity Network, c/o National Botanical Institute, Private Bag X101, Pretoria 0001, South Africa Ph: +27 12 8043200 Fax: +27 12 8045979 Email: reddatalist@sabonet.org

Conferences & Workshops, Courses & Fieldwork

Weed Alert!

17th October 2002, University of Melbourne

This seminar is presented by the Weed Society of Victoria. Topics will include: an assessment of new weeds; managing new weed incursion sites; and Victorian Weed Alert. For more information contact Ros Shepherd Ph/Fax: 03 9576 2949
Email: secwssv@surf.net.au.

Exploring Volunteer Bushcare Sites— Friends of Bradley Bushland

12th October 2002, Sydney

A series of walks visiting volunteer bush regeneration sites around Sydney and Wollongong has been organised by the AABR and the Volunteer Coordinators Network. This walk visits the regeneration site in the Bradley Bush Reserve. Meet at the corner of Middlehead Rd and Croquet Lane, Mosman, 9:00am. Contact Adam Burrowes Ph: 0419 784 025.

Conservation Breaks—Mardie Station

21st - 25th October, Western Australia

Help Conservation Volunteers Australia with management of Mesquite at Mardie Station by setting up research projects and undertaking weed control activities. For more information and to book Ph: 08 9336 6911
Email: perth@conservationvolunteers.com.au

Exploring Volunteer Bushcare Sites— National Trust of Australia

17th November 2002, Sydney

This walk will visit the Blackwood Sanctuary and Ahimsa. Meet at 10:00am at the corner of Beecroft Rd and Pennant Hills Rd. Contact Henny Roxburgh Ph: 02 9958 3674/0419 221 551 or Janet Rannard Ph: 02 9258 0132/0419 140 869.

2nd Postgraduate Course on Current Ecology and Evolution

1st December 2002, Cairns

This one-day course is organised by the Ecological Society of Australia, the NZ Ecological Society, and the Australasian Evolution Society. It targets people currently undertaking postgraduate research degrees, or those who plan to do so in the future. The course aims

to acquaint future researchers with current thinking in ecology and evolution. For more information contact mabood@rma.bio.mq.edu.au or see:

<http://www.bio.mq.edu.au/esa2002/>. Register at the Ecology 2002 website:

<http://www.tesag.jcu.edu.au/ecology2002>.

Alpine Ecology Course

5th - 11th January 2003, Bogong High Plains, Vic.

Presented by Latrobe University, this course is designed for land managers, ecologists, educators and conservationists. Learn about the plants, animals, landforms and soils that make up Australian alpine ecosystems. This course will be of special interest to those interested in indigenous species and their use in rehabilitation and restoration, and the suitability of indigenous alpine species for propagation and their use in successful rehabilitation projects. Two days of individual field projects enable participants to extend and apply their knowledge and skills. Participants learn how to collect and interpret information and use it to understand ecological processes. Contact Lesley Sayer

Ph: 03 9479 2190

Email: L.Sayer@latrobe.edu.au

Recovery: a Decade Towards a Biodiverse Future. 5th Australian Network for Plant Conservation National Conference and Conservation Techniques Workshops

25th Feb - 1st March 2003, Geelong, Victoria

This fifth National Conference of the Australian Network for Plant Conservation is hosted by the City of Greater Geelong. The program includes paper and poster presentations, workshops, field trips, conservation techniques workshops, and of course plenty of opportunity for networking at numerous social events. The deadline for the submission of abstracts has been extended to the 31st of October, early bird registration closes on the 31st of December, and full registration closes on the 10th of February 2003. For more information see the brochure enclosed with this issue of *Danthonia* or contact the ANPC National Office GPO Box 1777, Canberra, ACT 2601. Ph: 02 6250 9509 Fax: 02 6250 9523 Email: jeanette.mill@ea.gov.au

ANPC Regional Groups

Sydney Region

Provenance for Regeneration and Restoration

Tracey Armstrong, Mount Annan Botanic Garden; and Bob Makinson, Centre for Plant Conservation

In August, the ANPC Sydney Regional Group held a seminar on provenance for regeneration and restoration in collaboration with the Australian Association of Bush Regenerators (AABR) and the Centre for Plant Conservation (which is based at the Royal Botanic Gardens, Sydney). The seminar was held at Mount Annan Botanic Garden.

Our invited speakers were Dr. Maurizio Rossetto, Conservation Geneticist at Royal Botanic Gardens Sydney; and Peter Dixon, Senior Natural Resource Officer with the Department of Land and Water Conservation as well as President of AABR.

The two talks were aimed at an informed but not technical audience. Maurizio's presentation explained in plain language why genetics is a relevant issue for regeneration and restoration, especially for work on threatened species and communities. This gave some context for the rule-of-thumb approach to provenance that bush regenerators have followed for some years now. Peter's talk was about the practicalities, for individuals and agencies, of putting such a science-based approach into practice, without unduly straining resources and motivation.

Some of the major points from Maurizio's talk were:

- We must retain sufficient local genetic variation to allow future adaptation, expansion or recovery of species.
- Genetic diversity is important because it maximises adaptation potential, reduces vulnerability to sporadic changes and increases potential for speciation.
- Integrating genetics and species/habitat management provides best practice outcomes: research into provenance boundaries guides collection strategies; learning about variability and fitness helps define optimal population size; and learning about population dynamics (e.g. pollen and seed dispersal) helps suggest maximum tolerable levels of isolation.
- Integrating genetics and field-based conservation: the ideal conservation and regeneration approach is to select material carefully to ensure genetic integrity and long-term survival. It is best to rely on research-based protocols that satisfy practical and evolutionary requirements.

Peter Dixon gave us an historical overview of bush regeneration covering the last century, and pointed out that people have always strived for best practice operations. It's just that the goal posts keep changing as experience and research moves onward. This year's best practice can become the next decade's joke (or possible disaster!). But don't despair—even in the absence of detailed genetic information we can still avoid disasters.

He also gave us the benefit of his hands-on experience in this field and managed to combine Maurizio's research findings and protocols with what should be happening in bush regeneration today.

Peter's core message is: consult! He recommends the 'lunch and three bottles of wine' approach, where you bring together a number of people with expertise on the group or habitat that you want to work on (including a geneticist), and canvass what is and what is not known. This can identify many potential traps (genetic and other), help to refine options down to a manageable level, and also identify whether genetic research is likely to be necessary.

Work on threatened species and communities, of course, should always take place only in conjunction with the recovery team or management agency responsible.

After a quick lunch, Richard Johnstone (Mount Annan Botanic Garden's Seedstore Officer) and I led a walk for interested people around the Seedstore facility and also through an on-site remnant of Cumberland Plain Woodland, which is listed nationally as an endangered ecological community. We made it back to the cars just before the heavens opened and a spectacular lightning display lit up the afternoon sky.

This seminar was attended by 42 people, and 92 attended a night-time repeat at the Royal Botanic Gardens on the 21st August. At both sessions there was very good attendance of local government practitioners, an area which needs a lot of resourcing.

The three organisations will be looking at further joint activities.

Regional Group Coordinator: Tracey Armstrong.

Ph: 02 4634 7939

Tracey_Armstrong@rbgsyd.nsw.gov.au

For ANPC Regional Group contact details see p. 9

And Finally...

Garden Snail Query

I am investigating the effects of *Cantareus aspersus* (= *Helix aspersa* or garden snail) on two species of New Zealand threatened plants (the shrubby legumes *Clianthus puniceus* and *C. maximus*). The snail has a devastating effect on these species and can defoliate a plant overnight. Garden snails also demolish all seedlings as they germinate.

We have attempted several island restorations for *Clianthus puniceus* and *C. maximus*, as islands are seen as an 'easier' place being generally free of exotic herbivores. However, many offshore islands have garden snails and this has resulted in several

failures to establish *Clianthus puniceus* and *C. maximus*.

My enquiry is: Are there other examples of garden snails affecting threatened plants in the wild? Have there ever been any eradications of garden snails at sites or on islands? Are there any examples of effective control in the wild in order to protect native vegetation or a threatened plant? Any advice gratefully accepted!

Bec Stanley, Biodiversity Inventory, East Coast Hawkes Bay Conservancy, Department of Conservation, Gisborne. Ph: + 64 06 8690499
Email: rstanley@doc.govt.nz

Call for *Danthonia* Cover Images

Now that *Danthonia* has a glossy, full-colour cover, it provides the chance to give threatened plants, populations and ecosystems the profile they deserve. The ANPC National Office is always seeking good quality images to use for the cover, especially of plant groups, geographical areas etc. that we have not covered so far on a *Danthonia* cover. Examples include images of Australia's arid interior and cryptogam images. If you are interested in submitting an image, please contact Laura Vallee for specifications (details in front of *Danthonia*).

ANPC Membership List

Please note: the date in brackets indicates the year that the member has joined or renewed for. Addresses and names of contact persons are available from the National Office. Memberships are based on the calendar year (Jan.-Dec.).

Corporate Members

ACT Parks and Cons. Service, ACT (2001)
Alcoa World Alumina Australia, WA (2001)
Anne Clements & Associates Pty Ltd, NSW (2001)
Aust Institute of Horticulture Inc, NSW (2002)
Australian National Botanic Gardens, ACT (2002)
Aust Tree Seed Centre (CSIRO), ACT (2001)
Botanic Gardens of Adelaide, SA (2002)
Brisbane Botanic Gardens, QLD (2001)
C.A Henschke & Co., SA (2001)
Centre for Mined Land Rehabilitation, QLD (2002)
Centre for Plant Biodiv Rsch, ACT (2002)
Centre for Plant Conservation Genetics, NSW (2001)
City of Albury, Parks & Recreation Business Unit, NSW (2002)
Coffs Harbour City Council, NSW (2002)
Council of the City of Orange - Orange Botanic Gardens, NSW (2001)
CSIRO Publishing, VIC (2000)
Dept of Conservation and Land Management, WA (2002)
Dept Infrastructure, Planning & Environment, NT (2002)
Eurobodalla Native Botanic Gardens, NSW (1999)
Flecker Botanic Gardens, QLD (2000)
Forestry Tasmania, TAS (2000)
Geelong Botanic Gardens - City of Greater Geelong, VIC (2001)
Kings Park and Botanic Garden, WA (2001)
Macedon Ranges Shire Council, VIC (1999)
Maroochy Shire Council, QLD (2002)
NSW National Parks & Wildlife Service, NSW (2001)
Pacific Power, NSW (2000)

Qld Parks and Wildlife Service (Central Region), QLD (2002)
Queensland Herbarium, Dept of Environment & Heritage, QLD (2001)
Redland Shire Council, QLD (2002)
Roads and Traffic Authority, NSW (2001)
Royal Botanic Gardens Melbourne, VIC (2002)
Royal Botanic Gardens Sydney, NSW (2002)
Royal Tasmanian Botanical Gardens, TAS (2002)
Standing Committee on Forestry, ACT (2001)
Strathfield Municipal Council, NSW (2002)
Tasmanian Parks & Wildlife Service, TAS (2002)
Australian Arid Lands Botanic Garden, SA (2001)
Townsville City Council, QLD (2001)
WMC Olympic Dam Operations, SA (2002)
Wollongong Botanic Garden, NSW (2000)
Zoological Parks and Gardens Board of Victoria, VIC (2002)
Zoological Parks Board of NSW, NSW (2002)

International Associates

Canada

Canadian Botanical Conservation Network, (2002)
David Brackett, IUCN SSC, (2002)
Roy L Taylor, (2002)

Fiji

South Pacific Regional Herbarium, (2000)

Germany

Botanischer Garten und Botanisches, (2002)

India

Alexander Amirtham, (2002)

Indian Society for Conservation Biology, (2002)
Prof Suresh Pathiki, (2002)

Indonesia

Botanic Gardens of Indonesia (Kebun Raya), (2002)
Eka Karya Botanic Garden, (2002)
Indonesian Network for Plant Conservation, (2002)

New Zealand

Auckland Plant Collections Network, (2002)
David Given, (2003)
Neil Mitchell, (2001)
Wellington Plant Conservation Network, (2002)

Papua New Guinea

Paul Chatterton, (2002)

South Africa

John Donaldson, (2001)
National Botanical Institute, (2002)
Southern African Botanical Diversity Network (SABONET), (2002)

Sri Lanka

Zackeriya Mohamed Zarook, (2002)

Switzerland

Conservatoire et Jardin Botaniques, (2002)
Wendy Strahm, (2002)

UK

Botanic Gardens Conservation Intl, (2002)
IUCN/SSC UK Office, (2002)
PlantNet, (2002)
Royal Botanic Gardens Kew, (2001)
Timothy Walker, (2002)

United Arab Emirates

IUCN/SSC Re-introduction Specialist Group, (2002)

USA

Center for Plant Conservation, (2002)
 Darren Touchell, (2002)
 Don Falk, (2002)
 ECO-SEA, (2002)
 Georgia Endangered Plant Stewardship
 Network, (2002)
 Missouri Botanic Garden Library, (2003)

Western Samoa

Vailima Botanic Gardens, (2002)

Community Groups

Association of Societies for Growing
 Australian Plants, NSW (2002)
 Aust Plants Society - Central West Grp Inc,
 NSW (2000)
 Aust Plants Society - Newcastle Grp Inc.,
 NSW (2000)
 Aust Plants Society - North Shore Group,
 NSW (2001)
 Aust Plants Society - Northern Grp Inc, TAS
 (2001)
 Aust Plants Society - Nowra Group, NSW
 (2002)
 Aust Plants Society - South West Slopes,
 NSW (2003)
 Aust Plants Society - SW Slopes, NSW (2000)
 Aust Plants Society, NSW (2002)
 Australasian Regional Assoc of Zoological
 Parks & Aquaria, NSW (2002)
 Australian Association of Bush Regenerators,
 NSW (2002)
 Australian Native Plant Society (Canberra
 Region), ACT (2002)
 Australian Plants Society - Warringah, NSW
 (2002)
 Blue Mtns Wildplant Rescue Service, NSW
 (2001)
 Burnley College, VIC (1999)
 Burrendong Arboretum, NSW (2001)
 Canberra and South-East Region Environment
 Centre, ACT (2002)
 Community Biodiversity Network, NSW (2002)
 Dept Land and Water Conservation, NSW
 (2002)
 Friends of Eurobodalla Regional Botanic
 Gardens, NSW (2000)
 Friends of Grasslands, ACT (2002)
 Friends of Peter Francis Points Arboretum,
 VIC (2002)
 Friends of the Australian National Botanic
 Gardens, ACT (2002)
 Friends of the North Coast Regional Botanic
 Garden, NSW (1999)
 Greening Australia - South West Slopes, NSW
 (2002)
 Greening Australia South-West Plains, NSW
 (1999)
 Greening Australia Ltd, ACT (2001)
 Greening Australia NSW Inc., NSW (2002)
 Hunter Region Botanic Gardens Ltd., NSW
 (2002)
 Indigenous Flora and Fauna Association, VIC
 (2000)
 Lismore Rainforest Botanic Gardens, NSW
 (2000)
 Merri Creek Management Committee, VIC
 (2000)
 Monarto Zoological Park, SA (2000)
 Olive Pink Botanic Garden, NT (2002)
 Pangarinda Arboretum Committee, SA (2002)
 Royal Zoological Society of SA Inc., SA

(2002)
 SGAP - Dryandra Study Group, WA (2002)
 SGAP - Ipswich Branch, QLD (2000)
 SGAP - NSW Ltd - Blue Mountains Group,
 NSW (2002)
 SGAP - Qld Region Inc., QLD (2002)
 Stony Range Flora & Fauna Reserve, NSW
 (2002)
 Tasmanian Arboretum Inc, TAS (2001)
 Threatened Species Network, NSW (2002)
 Threatened Species Network, NT (2002)
 Threatened Species Network, QLD (2002)
 Threatened Species Network, SA (2002)
 Threatened Species Network, TAS (2002)
 Threatened Species Network, VIC (2002)
 Threatened Species Network, WA (2002)
 Trust for Nature, VIC (2001)
 Victorian National Parks Association, VIC
 (2002)
 Wildflower Society of WA - Northern Suburbs
 Branch, WA (2001)
 Wildflower Society of WA Inc, WA (2000)
 Wildlife Preservation Society of Australia Inc,
 NSW (2002)
 World Wide Fund for Nature Australia, NSW
 (2001)

Individual Members

Gail Abbott, NSW (2001)
 A/Prof Paul Adam, NSW (2002)
 Jan Allen, NSW (2001)
 Ian Anderson, ACT (2003)
 Sarah Ashmore, QLD (2002)
 N Ashworth, QLD (2000)
 Robert Attwood, NSW (2002)
 Ian Baird, NSW (2002)
 Katherine Baker, WA (2001)
 B & B Barker, VIC (1999)
 Clive Barker, NSW (2002)
 Tim Barlow, VIC (1999)
 Sarah Barrett, WA (2002)
 Tamera Beath, NSW (2002)
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 Margaret Bell, NSW (2001)
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 Jerome Bull, WA (2002)
 Louise Bull, NSW (2002)
 John Burdett, ACT (2002)
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 Geoff Butler, NSW (Hon. Life Member)
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 Geoff Carr, VIC (2002)
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 John Clarkson, QLD (2000)
 Anne Coates, WA (2002)
 Dr Terry Coates, VIC (2002)
 Anne Cochrane, WA (2002)
 Ian Cole, NSW (2000)
 Barry Collier, NSW (2002)
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 Meredith Cosgrove, ACT (2002)
 Catherine Costello, VIC (2003)
 Brad Costin, VIC (2001)

Ian Cox, NSW (2002)
 Isobel Crawford, ACT (2001)
 Darren Crayn, NSW (2002)
 Simon Cropper, VIC (2002)
 Sharon Cummings, NSW (2002)
 Peter Cuneo, NSW (2001)
 Paul Davies, NSW (1999)
 Richard Davies, SA (2001)
 Claire de Lacey, NSW (2002)
 Mojca Debevec, NSW (2002)
 John Delpratt, VIC (2002)
 Sally Dillon, QLD (2002)
 Sophia Dimitriadis, ACT (2002)
 Ian (Bob) Dixon, WA (2002)
 Michael Doherty, ACT (2002)
 Ross Doig, NSW (2002)
 Wendy Dossetor, NSW (2001)
 Steve Douglas, NSW (2002)
 Tania Dow, NSW (2002)
 Helen Drewe, NSW (2002)
 David Duncan, ACT (2002)
 Christopher Dwyer, NSW (2002)
 Gill Earl, NSW (2000)
 Robbie Economos-Shaw, NSW (2001)
 Deborah Edwards, ACT (2000)
 Rodger Elliot, VIC (2000)
 Alison Elvin, NSW (2000)
 Salli Felton, NSW (2001)
 Paul Field, (1999)
 Lance Fitzgerald, NSW (2001)
 Paul Foreman, VIC (2000)
 Fig Forest, NSW (2002)
 Annabel Forsyth, ACT (2002)
 Julie Foster, ACT (2001)
 Ian Fox, QLD (2002)
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Australian Network for Plant Conservation

Recovery: a Decade Towards a Biodiverse Future

Fifth National Conference and Conservation Techniques Workshops

Geelong, Victoria

Monday 24th February - Saturday 1st March 2003

NOW TAKING REGISTRATIONS



Illustration and © Enid Mayfield

Geranium 'sp. 1' was known from only two specimens and had not been seen since 1903. It was thought to have become extinct through clearing of urban grasslands until 1999 when a few specimens were gathered in surveys in outer Melbourne regions. It was discovered in the Geelong region in 2000 by the City of Greater Geelong's Biodiversity Study.

Conference Themes

Restoration
Cryptogams
Recovery Planning
Threat Abatement Planning
Conservation Outside Reserves
Global Plant Conservation Strategy
Geelong Regions Biodiversity Study
Conservation of Ecological Communities

Proposed Workshop Topics

Cryptogams
Translocation
Seed Biology
Orchid Conservation
Conservation Genetics
Field Survey Techniques
Seed Collection and Handling
Plant Propagation for Conservation

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